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ABSTRACT

The roots of environmental problems at local, national, regional, and global levels lie in factors associated with a very low level of economic development and insufficient environmental awareness caused by a lack of education. Environmental education becomes a cornerstone of public awareness about the environment and the solution and prevention of its problems. If sustainable development is to be achieved, all levels of the educational system must be radically reformed to incorporate environmental education. Distance education has a great sociological justification as it can help in extending and equalizing educational opportunities. Justification for the introduction of new educational technologies might be found in areas such as environmental education where there is a shortage of trained and qualified teachers or where the subjects demand visual presentation that a teacher cannot offer. Through the use of new communications technologies, access to good educational programs can greatly be extended to large audiences in rural and remote areas with tremendous flexibility in subject matter content. A multidimensional approach should use schools, radio, television, nonformal education centers, newspapers, community assemblies, nongovernmental agencies, business chambers and trade associations, and unions. Environmental issues that should be addressed through distance education are soil erosion, emissions of greenhouse gases, declining wildlands, pollution, rapid urbanization, and solid wastes. (YLB)

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ENVIRONMENTAL EDUCATION THROUGH DISTANCE EDUCATION

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"The technology surrounding communication is advancing while its costs are going steadily down. The time is ripe to take selective advantage of these technological breakthrough to enhance the quality, outreach and cost-effectiveness of basic education."

Federico Mayor
Director-General
UNESCO

I. INTRODUCTION

1. Our global value systems on development are in a critical state of imbalance. In the past, the main concern of policy-makers and economists was physical growth, on the wrong assumption that general socioeconomic growth would trickle down to the poor sector of society. We know that this theory does not work. So the policy-makers moved towards growth with equity, seeking to open up opportunities for the disadvantaged and marginal sectors to share in the benefits of economic expansion. However, the production and marketing systems of free trade favored the affluent, educated, and organized, to the detriment of the poor. So there was a third movement towards a basic needs strategy, in which planners identified those basic goods and services which every member of a society should have to live a decent quality of life. However, since the productive and distribution systems remained in the hands of the powerful and rich, again the poor did not gain from this approach.

2. In all these systems, a constant critical and unfortunate result has been the vast plunder and destruction of our natural resources and forestries, especially in the developing countries. A major reason has been the obsession of mankind with material and physical growth, and for consumer goods and the enjoyment of the luxurious life of the maldeveloped elite. This led to the unhampered exploitation of the world's most precious natural resources, ranging from water, trees, minerals, to virgin soil and even animals (not just for food, but for their furs and claws, tusks, etc.) and thousands upon thousands of the planet's once unlimited flora and fauna. Man's insatiable appetite for material goods and the money to buy these goods have created this imbalance in our value system. Simply put, the rich are getting richer and the poor poorer.

3. The world is at a critical stage today. While the Russian communist system has been abandoned, the drive for armaments buildup and massive armaments purchases in various countries in Asia, Latin America, and Africa, continue in massive

proportion. One painful impact of such war-preparations is the thousands upon thousands of landmines dotting the farm fields and terrain of countries still at war with each other or binding its wounds after a crippling war. In such land-mined fields are gone the tapestry of green leaves and forest trees which once flourished in these countryside. Every effort must be waged by the United Nations and the world's armaments-sellers and buyers to cut down on the huge expenditures and monies spent on these destructive tools against mankind. One shudders at the thought that in war, any war, it is children, women and old folks who suffer most.

4. The enlightened view today is that poor cannot be forever aided and imbued with a state of mendicancy; that only a self-reliant process of growth and empowerment can enable the poor to lift themselves out of their state of poverty and degradation. Today there is therefore a shift away from material and financial concerns, and a turning towards the new world of improved quality of life built on education and new knowledge, skills, and empowering values. So that in the past few years, the growth strategy has devolved into a focused drive on poverty alleviation and women upliftment. The latter approach particularly is a potentially powerful strategy for development. It is anchored on the proven assumption that bringing in the 50 percent female or other half of the population into the development process should result not in just incremental progress but in quantum leaps in higher literacy rates, increased female labor productivity, smaller family sizes, improved health and nutrition habits, and in the better care and protection of our environment.

5. If development is to grow and be made sustainable, it must be anchored on an environment that is self-renewing, protected, and nurtured. Similarly, if there is any drive towards environmental protection which will count in the future it must be one directed at women. This is not to deny that all other sectors must be approached — males, children, old folks, even the disabled and those outside the normal circles of society. All must be addressed. But women should be the first target group for their enlightenment will reach out to the family and children, who are tomorrow's mass consumers.

6. It is, therefore, that everyone needs to know something about the environment, although it may not be equal in scope or depth. This is because everyone lives in some sort of environment; their actions either enhance or destroy their surrounding environment. Farmers, long neglected and marginalized, must cope with the harsh reality of worked-over soil, natural calamities, and severely reduced prices for their crops and fish. Ignorant farming technology and basic tools do not enable them to feed their hunger and protect their immediate surrounding at the same time. The case of slash-and-burn mountain farmers is one case. As they move from locale to locale, burning once-fertile soil tops and clearing away forests, they destroy their own future and that of children unborn. The worst of course are the commercial exploiters, who violate protectionist laws, and plunder trees and minerals and destroy fishing grounds, in their relentless drive for profits and power. Today, much too late in the game, we have discovered how all these reckless and profit-hungry damages to our environment have impacted on our daily lives. Potable water is harder to get. Health and sanitation are always endangered by polluted rivers, garbage-infested creeks, and open waste

systems. Floods occur due to soil erosion which in turn are caused by forest destruction and dam overflows. Ill-informed engineers carve out irrigation channels, build dams, and clear farmlands for high-rise condominiums, at the expense of ever-sinking grounds and lower food production potential.

7. In the recent past, our values system demanded the accumulation of wealth and money for the purchase of symbols of affluence, power, and social status. Automobiles had to be large with powerful engines, junk food had to be packaged in vast amounts of box and aluminum and plastic wrappers, durable goods in the house had to have fancy design and frills just for the purpose of storing food, clothes had to be shaped and sized in all kinds of luxury and unnecessary frills, even medical pills had to be bottled in attractive labels and marketed with huge advertising campaigns, and houses and high-rise apartments had to be built for the fancy desires of the wealthy and powerful. These drives nurtured a value system in which people began sacrificing, working harder and meaner in their drive for material goods and material values, and being little concerned with their immediate environments and the rich natural resources they once held. Even the education system was devoid of this concern — education emphasized the academic, the ideal and western-influenced values of individual competitiveness, family breakups and an obsession for divorce, industrial growth at the expense of the poor and uneducated, deprivation of the rural sector and the rural populations especially the female sector, and mastery of the planet and all its resources. This philosophy put man in the center of the universe; blinding him to the evils and dangers of destroying earth's foliage, greenery, and resources from land and sea. The eastern philosophy of being one with nature, of living with nature and all its bounties, of protecting it, of nurturing the family and of collective responsibility towards the community.

8. The United Nations Development Program in its Human Development Index (HDI) point to more than two-thirds of the world's populace surviving below or at the poverty line. And resources are even growing more scarce. That is why it is crucial to put balance back in our values system. Over the long term, any damage to environment will impact negatively on our health, economy, productivity, living standards, quality of life and cause grave social disturbances. The environment is affected by individual actions, community or group actions, policies or lack of policies in critical areas, or even the nonexistence of environmental protection policies.

9. Where the powerful, rich and leaders neglected the environment, how would one expect the individual or community to take the right attitude? Yet today we know that if quality development is to take place the protection and conservation of the environment should be everyone's concern. The imbalance that must be corrected: everyone must take action in environmental conservation and protection — the individual, community, government, national and regional levels. One of the biggest obstacles to sustained growth, endogenous technological progress and environmental education in developing countries is the lack of education. The conventional means of spreading education are proving to be inadequate in the face of growing populations. Although the proportion of adults in developing countries who are literate is estimated to have increased over the past four decades from about 30 per cent to more than 50

per cent, yet because of population growth, there has been an increase of about 100 million in the absolute number of illiterate adults since 1960. Furthermore, the quality of schooling remains low in many countries and, in particular, in remote rural areas where it is inevitably inferior to that in urban areas.

10. Conventional methods of imparting instruction are now inadequate, with the school no longer the sole purveyor of knowledge and shaper of social attitudes. The mass communications media such as radio and television play a crucial role in the dissemination of knowledge. Radio has the advantages of wide reach, low cost and can be used even in unelectrified locations. Properly designed and supported radio projects have the potential for improving learning (and in certain cases, reducing costs). Television can also be an extremely powerful instrument for spreading education. Space technology, with the invention of the direct broadcast satellite (DBS), has made possible the reception of television programs even in very remote areas without setting up a television station, thereby reducing capital costs of such countries including Canada, Japan, India, the former USSR and the United States; with USSR, Canada and India having operational DBS systems. More and more countries are considering how this system might be used for educational purposes.

11. There are several reasons for the increased use of made media in education. First, the educational systems in several developing countries are not suitable for meeting the challenge of economic growth which is primarily based on agricultural and rural development. Patterned each on the basis of its individual culture the education systems in many of these countries are now undergoing a change with emphasis on the provision of practical knowledge to farmers and rural youth for the development of appropriate skills. In several countries, the technological expertise needed for rural people and in many cases extension workers lace training in the skills of teaching adults. This situation warrants incorporating the advances of communications technology into new techniques of teaching. Second, the human and financial resources available for education are limited in many countries. Traditional and institutional methods have proved inadequate to fulfill the growing needs of formal as well as nonformal education and now, for the first time, mass media can provide the means to offer education in selected fields including environmental education to large numbers of people without incurring huge expenditures on overheads and infrastructure. Third, there is a growing awareness on the part of educationists and policy planners, of the decline in the quality of education, despite quantitative gains. Mass media can enlarge access to the best available teaching talent and benefit a large number of people.

II. DISTANCE EDUCATION: THE CONCEPT

12. Education is not only a social and moral imperative, it is also an economic necessity. Development holistically conceived in terms of cultural, social, political and

economic domains calls for massive need-oriented education. In turn, it is the need-based nature of education which brings educational technology[1] into play.

13. With the development of educational technology, the means and forms of providing teaching-learning situations have multiplied and diversified; so have the educational needs of the heterogeneous groups in the community. A single educational program (such as an inflexible conventional education system) proves inadequate to suit the needs of everyone. Conventional education systems with uniform methods of teaching do not make sufficient provision for the variations caused by socioeconomic status, age and economically different backgrounds. As a result, disadvantaged groups such as women have been unable to profit from this system. The traditional system, therefore, need to be augmented and supplemented by alternative methods and processes which emphasize individualization of instruction and self-determined pace of the learner. Distance education systems are well known for their flexibility, individualization and adoption of new information, technologies in course development, production, delivery and student support as per their individual needs. Distance education refers to the teaching and learning process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner. Distance education in terms of media usually involves a combination of media (such as radio, TV, film, audio and videotapes, computers and microprocessors) so as to not only compensate for the limitations of an individual medium but also to derive the maximum advantage from all the media used. The advent of modern communication media has shown that education need no longer be limited to face-to-face learning situations. Learning can be uncoupled from schooling. The media such as radio, television and film — can teach people who have had little or no formal education and bring benefits to the very doorstep of the recipients. Learning in the distance education mode overcomes the constraints of (i) specified locations and (ii) timings of study which characterize face-to-face teaching. The participants can choose their place, time and mode of study. It makes available to adults and out-of-school youth as well as educationally-disadvantaged groups, general, vocational and professional-oriented courses without affecting their capacity to earn their livelihood.

14. Distance education has a great sociological justification as it can help not only in extending education but also in equalizing educational opportunities and thereby help varied and dispersed student populations, even in rural areas. The basic tenet of distance education is that education should be taken to where people are rather than the other way. Many countries in this region have expanded educational opportunities by adopting the distance education system. Australia has a long-standing record spread over several years of achievement in this field. Attempts have been made in several developing countries of this region to explore the use of distance education to provide the rural poor access to education. I cite only a few: the School Broadcasting Program, Bangladesh; various institutes of correspondence courses in India, including SNDT Women's University, Open School of the Central Board of Secondary Education and

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[1] Educational technology can be defined as a process of identifying aims and objectives, planning the learning environment, exploring and structuring the subject matter, selecting appropriate teaching strategies and learning media, evaluating the effectiveness of learning system and using the insights gained from evaluation to improve the effectiveness of teaching-learning system.

Indira Gandhi National Open University; Allama Iqbal Open University, Pakistan; Korea Correspondence College, Republic of Korea; Radio Education in Nepal; Open University in Sri Lanka; and Sukhothai Thammathirate Open University, Thailand.

15. Justification for the introduction of new educational technologies might be found in areas (such as environmental education) where there is a shortage of trained and qualified teachers, or where teacher performance is poor, or where the subjects demand visual presentation which cannot be offered by a teacher. A media-based course appears to be more economical than a conventional course when a large number of students are involved and opportunity costs are lower. Studies conducted by international agencies such as UNESCO, the World Bank and the Agency for International Development (AID), the British Council and the Open University of Britain show that the media such as radio, television and film can teach people with little or no formal education and bring benefits to the very doorstep of the recipient. A World Bank report explains the situation as follows:

> "The demand for school places is beginning to outstrip the capacity of many economies to supply them. At the same time, technical changes in medicine, in agriculture, and in engineering mean that new ways of living are open to many adults but may be open only if they have received some relevant education. This double demand, for schools and for adult education, puts a strain on educational systems that few can bear. The scale of the demand has led to a search for alternative methods of education that can reach more people, or reach different people, or do so more cheaply. Distance education offers some of these possibilities."

16. Through the use of new communications technologies, access to good educational programs can greatly be extended to large audiences in rural and remote areas with tremendous flexibility in subject matter content, in locations served, and with a choice of narrow or wide band formats. Two new technologies, namely satellite communication and fiber optic cable, have dramatically enhanced educational capabilities, but others such as the VHF terrestrial radio telephone, cellular radio technology and various new mobile communications techniques are making important contributions. Satellite and fibre optic transmission technologies are in fact complementary. Satellites are still best for broadcasting to provide for rural and remote access, while fibre optics are well suited to linking centers of learning, university campuses, etc. Fibre optic-based educational networks can also be "piggy-backed" onto public telecommunications networks at a modest cost. Today the future for educational transmission costs is very promising. In short, the reduced costs of technology could make a large number of educational services available, through distance education mode, to more and more people. Where appropriate, we must examine, evaluate and utilize the many new transmission and programming capabilities that are now available from advanced communications technologies especially satellites. Now, the question is not whether developing countries can afford the peaceful uses of outer space. Rather, it is whether they can afford to ignore them. Furthermore, effective coordination through regional cooperation could help realize the potential of such remarkable technologies.

17. Corollary to these technological expansions, the area of education which is considered to be fastest growing today is that of distance education. It has been perceived as a powerful means to utilize telecommunications technology for the dissemination of teaching experiences and ideas, information, production of two way exchanges between the teacher and the learner, as well as bridging time and space limitation. This can initiate a process for development of total education mechanism in the 21st century with prominent persons/specialists where everybody can hear, talk and see the other with inexpensive methods for Third World countries. Distance education has emerged as an alternative system of education. In recent years, distance education through open universities has been catching up in several countries — developed and developing, socialist and nonsocialist. In the 21st century, distance education, based on the use of modern communications and multimedia materials, is predicted to be the major new movement in human resource development. The inherent cost-effectiveness of multimediated distance education suggests that this mode of instruction is the best, if not the only available alternative. Furthermore, the scope of satellite-based distance education should be examined in this context since the space system offers vast advantages over that of the terrestrial system, especially when warranted by the appropriate location, area and diversity of the country concerned. Also, the satellite media are ideal for implementing cooperative multi-national programs in distance education.

18. Why high-tech for the poor? Why not? Modern science and high-technology can undoubtedly be brought to the service of the disadvantaged man (the poorest of the poor, or the deprived, in the original words of Mahatma Gandhi), to the deprived rural communities, to the most far-flung villages, and achieve a better quality of life for them in ways that are more rapid, more innovative, more interesting and more participatory, than traditional methods of educating people within the four walls of the classroom. The conservative approach which proclaims that sophisticated technology can be adopted only step-by-step by developing countries has often been proven counter-productive as ably explained by the noted Indian scientist, the late Dr. Vikram Sarabhai, who said:

> "...a developing nation following a Step-by-Step approach towards progress is landed with units of Small Size, which do not permit the economic development of new technologies. Through undertaking ventures of uneconomic size with obsolete technologies, the race with advanced nations is lost before it is started."

III. ENVIRONMENTAL EDUCATION

19. Sustainable development of natural resources calls for people's awareness of the environmental problems involved and often assures their cooperation. Given the reach of the print media, it is important to use radio and television to spread the message on environmental matters to the public. In fact, the electronic media may be the only means of reaching vast sections of geographically and economically isolated segments of society. Within the formal and non-formal education system, there is need to use distance education methods for spreading environmental education. The

traditional system cannot provide the environmentally relevant lessons as fast and effectively as can be done with distance education methods. It is therefore appropriate to explore the scope for utilizing the new educational technique for spreading the right message on for environmental and natural resource management. Several Asian developing countries have established environmental education and training programs. They have not progressed fast, for want of training and resources. Distance education may be a cost-effective technique for achieving their objective. Formal as well as non-formal education would have an environmental component based on the distance education mode of delivery. The non-formal educational programs would go beyond the student community to the general public, particularly to the segments of society who are directly affected by environmental measures. In this task, the role of radio, and where appropriate TV, will be emphasized, with adequate training and facilities needed to handle the messages.

20. It must first and foremost begin with the mind. Environmental concern is a state of the mind. It is a mind-set. It is attitudes. It is anchored on values. Values shape our attitudes and this is where the education and awareness-building must begin. Therefore the first step towards protection of environment should be the development of proper attitudes towards one's environment. It begins small. With our immediate homes and huts, with our immediate neighborhood. The concern for gigantic forests and land and sea resources will come later. This means that there should be appropriate knowledge for everyone, at whatever socioeconomic level, which can promote awareness and protection of the environment. This suggests that there is need for environmental protection for everyone. Ideally, it should start right from childhood. It should not focus at home, in the school, and outside the school, taking in the whole family and at all levels such as the village, the region, and then the national level. It should cover households and their children, and all the way up to policy-makers, implementors, planners, in both the public and private sectors, as well as general public.

21. It requires a multidimension approach. The planners and implementors must work with the participating institutions like schools, nonformal education centers, newspapers and radio and TV stations, community assemblies, farmers' and fishermen's cooperatives, factory unions, government associations, business chambers and trade associations, civic and religious groups, and lobbyists in parliament and congress. Each and every target public has particular needs and capabilities, and therefore each environmental information campaign must be calibrated to address their respective needs and capabilities.

22. Needless to say, the advantage of using formal education or the schooling system are quite obvious. There is a captive audience of children and teachers who must attend regular classes in set places and set times. However, the reach of such a delivery system will be limited. There are too many rigidities about the schooling system which disallow a fullblown campaign. An alternative system is distance education and nonformal education. Since we are living in an authentic communications technology age, distance education appears to be a strong possibility and appropriate strategy to serve all these groups simultaneously. Even in the formal education system, the distance education system can be used. First of all, there should be an integration of any

information and awareness-building campaign with government policy and plans. There should be no dividing or conflicting lines of priority and thrusts. The curricula can be reshaped to accommodate these key messages. However, teachers must be prepared to handle these campaigns through intensive, short-term training. Teachers at the primary, secondary and tertiary levels, as well as in vocational and technical education, can be involved. So with the parents in their Parent-Teacher Associations. What role can distance education play in a formal situation like this?

23. For one, teachers number by the hundreds of thousands in any country. They make a formidable force for change if attuned properly to the environmental campaign. But their fixed schedules and classroom-based activities prohibit their massive use. The distance education mode therefore is appropriate: through self-learning and at their own pace, they can get oriented on environmental issues through correspondence materials, as well as the use in appropriate community centers with multimedia technology where the best and most informed lecturers/experts in environmental problems can reach them through programmed radio and AV cassettes. Mass media can also support these activities. To administer the right inter-relationships, each school and community can organize a small Management Committee to distribute the distance education materials, arrange for weekly or monthly work sessions, and hold business meetings involving the teachers and community.

24. Furthermore, students can be involved in social activities or community services where they can influence thousands of others as advocacy agents. They can be provided radio sets, radio cassettes, posters, and tons of materials which can be spread and distributed intelligently. Youth and Environment Clubs can be organized; radio programs can be tapped; and telephone brigades can be mobilized for the environmental protection drive. Sports games, competitive exhibitions, and town festival and trade fairs are all fair game for the environmental campaign.

25. Nongovernment organizations (NGOs) can be depended upon to initiate innovative approaches. They can work with virtually any group, especially the rural and disadvantaged population, and can become effective social marketing agents. They can mobilize elected government officials and encourage them to volunteer services during holidays and weekdays. Working folks with time in-between their hands, even at work, can make use of distance education materials if presented in the right designs and contents such as construction crews in road projects, fishermen out at sea, farmers at noontime and lunch breaks, travellers waiting at airports and customs areas for their airplanes and boats, people queuing up for tax payments or tickets at railway and bus stands, individuals and groups dropping in at the parks, zoos, public playgrounds, shopping malls, etc. Even workers handling rickshaws, tricycles and taxis have breakdowns which can be accommodated with entertaining distance education educational comics, primers and illustrated manuals on the environment.

26. An activist agent of environmental education using distance and nonformal education knows that there are no limits to the type, category or quantity of target audience which can benefit from this delivery service. Take the government or public sector. Environmental awareness and support are being generated today in the halls of

Parliament and Congress by involving policy-makers such as Members of Parliament, or Senators and Congressmen, in public functions and information drives. Such information can be articulated in informed legislation and policy issuances. These in turn will receive strong public support only if and when the public itself is fully aware of environmental dangers and risks confronting society. Any awareness-building therefore must strike at two levels: at government policy-makers, including officers at city hall, law-enforcement agents and extension workers, and at the citizenry at large including farmers, fishermen, factory hands, service personnel, and small/family entrepreneurs. Their co-active interconnection will redound in strong policies and citizenry support. They can range from all kinds of government officials such as local elected representatives or city hall officers, to policemen and tax collectors and extension workers. Furthermore, distance education can be deployed to reach the most marginal workers and laborers including farmers, fishermen, road workers, factory hands, and household-based small entrepreneurs.

27. The clientele for environmental education are vast, sprawling, and available anywhere. For one, there are the thousands of road workers in Asia, especially South Asia countries, including female workers, who during their short rest periods can be made eager learners of environmental education. In one of the family-based poverty alleviation projects of Asian Development Bank in Bangladesh, illiterate farmers and fishermen were exposed to adult literacy sessions in the early hours of sunrise and the late hours of sunset, in-between their working hours. The same can be applied to road construction crews; even to roaming caretakers of carabaos, goats, sheep, cows and bulls, who, in-between these hours, can be exposed to environmental education. Environmental education through distance and nonformal education indeed knows no bounds nor time.

IV. ENVIRONMENTAL ISSUES TO BE ADDRESSED THROUGH ENVIRONMENTAL DISTANCE EDUCATION[1]

28. The world faces a wide variety of critical environmental threats: degradation of soil, water and marine resources essential to increased food production; widespread, health-threatening pollution; stratospheric ozone depletion; global climate change; and loss of biodiversity.

29. Soil erosion, and loss of soil productively reduce yields and remove large areas of agricultural land from production every year. According to recent assessment, 1.2 billion hectares an area larger than India and China together representing 11 percent of the earth's vegetated surface have been moderately or severely degraded since 1945. Sustainable development means more efficient use of arable lands as well as development and adoption of improved agricultural practices and technologies to increase yields. It means avoiding the expansion of agriculture onto steep hillside or marginal soils that would rapidly erode.

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[1] Section IV on Environmental Issues was prepared by Miss Kamala Sharma, M. Sc. (Environmental Technology and Management).

30. Current levels of emissions of greenhouse gases from human activities exceed the earth's ability to absorb them; such emission would cause global warming of the climate in long term. These fuels are mined and burned, and the waste is discarded into the environment. As a result they are a major source of the trace green house gases that threaten to alter the climate. The resulting changes in temperature, rainfall patterns, and eventually sea levels would have devastating effects on ecosystems and health and livelihoods of people, especially those directly dependent on natural systems. Stratospheric ozone, which absorbs much of the sun's damaging ultraviolet rays, is being depleted by the production and use of chloroflorocarbon and other related compound. Increases in ultraviolet radiation causes skin cancer and cataracts, and may disrupt the marine food chain and damage crops. Sustainable development means limiting the global rate of increase of greenhouse gases and eventually, stabilizing the atmospheric concentration of these gases. Sustainable development also means preventing degradation of the earth's protective ozone layer.

31. The area of wildlands continues to decline, reducing the habitat available for species other than the few that humans manage or that can survive in the domesticated environment. Tropical forests, coral reef ecosystems, coastal mangrove forests, and other wetlands and many unique habitats are being rapidly destroyed, and species extinction is increasing. Thus extinction is contributing to the imbalance of the food chain thus the whole ecosystem. Sustainable development means that the richness of earth's biodiversity would be conserved for future generations by greatly slowing and, if possible halting extinction of habitat and ecosystem destructive.

32. Industrial, agricultural and human waste are polluting surface and groundwater and weathering lakes and estuaries in virtually every country. Water pollution is largely caused by domestic sewage but is compounded by industrial wastes. Surface water contaminates such as fecal coliform and dissolved mercury often exceed recommended standards many times over. Given the lack of water treatment or alternative clean water resource, water contamination is a major health threat. Sustainable development means conserving water by ending wasteful uses and improving the efficiency of water systems. It also means improving water quality and limiting surface water withdrals to the rate of regeneration.

33. Many freshwater and marine fisheries are already being harvested at levels that are now, or are close to becoming unsustainable. In 8 of the world's 17 ocean fisheries, the amount of fish caught exceeded the lower range of the estimated sustainable catch. Increasing pollution in coastal waters and destruction of coastal estuaries, which provide reproductive grounds for 90 percent of the world's marine catch, are also degrading the fisheries. Under these circumstances, expanding the catch will prove difficult, it may take years of rehabilitation to retain current amount cf catch. Sustainable development means balancing the catch with the regeneration time and avoiding overharvesting of the waters.

34. Rapid urbanization, one of the most important demographic and social changes of the century, has both positive and negative environmental impacts. Urban air pollution is at critical levels. Urban transport is the largest cause of air pollution in

most cities of the world. Vehicle population are doubling every seven years and a large share of these are high polluting two stroke and diesel vehicles. Industries and building heat sources are the other major sources of air pollution. Sustainable urban development means reducing emission in the urban transport sector requires altering the vehicles, fuels and alternative modes of travel.

35. The problems associated with the management of solid wastes in present society are complex because of the quantity and divers nature of the wastes, the development of sprawling urban areas, the funding limitations for public services in many large cities, the impacts of technology and the emerging limitations in both energy and raw materials. For sustainable development there should be implementation of integrated solid waste management system, which includes source reduction, recycling, waste transformation and landfilling. Source reduction is first in the hierarchy because it is the most effective way to reduce the quantity of waste, the cost associated with its handling and its environmental impacts. Recycling is an important factor in helping to reduce the demand on resources and the amount of waste requiring disposal by landfilling. The transformation of waste (e.g. compost) materials usually results in the reduced use of landfill capacity. Landfilling, the last rank in the hierarchy, involves the controlled disposal of wastes and its is the most common method of ultimate disposal for waste residuals.

36. In brief environmental problems exist at local, national, regional and global levels. The roots of these problems lie in factors associated with a very low level of economic development and insufficient environmental awareness caused by a lack of environmental education. What is needed is to understand the causes and effects of these problems and devise ways and means for their solution. A dynamic measure that could bring appropriate responses to these problems would be to educate the people of all ages on the environment for making better decisions. In this context environmental education becomes a corner stone of public awareness about the environment and the solution and prevention of its problems. If sustainable development is to be achieved a radical reformation of all levels of the educational system is required to incorporate environmental education.